



Walnuts come in a variety of shapes and sizes. Clockwise from top: Eastern Black (*J. nigra*), American Butternut (*J. cinerea*), Texas Black (*J. microcarpa*), and Persian/English (*J. regia*).

their shells, which are somewhat larger than a golf ball. This should be a walnut-lover's dream, but unfortunately, the nutmeat inside the jumbo shell isn't any larger than usual.

Many specimens are also different kinds, called cultivars or varieties, of *J. regia*, the so-called English or Persian walnut. *J. regia* is the most widely marketed walnut type in the United States. *J. regia* varieties are the mainstay of California's walnut industry, which produces nearly all of the nation's \$300 million walnut harvest.

Known formally as the ARS National Clonal Germplasm Repository for Tree Fruit and Nut Crops and Grapes, this genebank belongs to a nationwide network of ARS-managed collections. These centers "protect the natural genetic richness of hundreds of plant species," says Davis repository curator Ed W. Stover, an ARS horticulturist.

Fingerprinting Walnut Trees

The genebank serves as an invaluable resource for breeders, growers, the nursery industry, and researchers—including, of course, ARS's own scientists at the repository. For instance, walnut collection manager and geneticist Mallikarjuna K. Aradhya worked with University of California at Davis colleagues in using samples from repository trees to pinpoint telltale stretches of genetic material called SSRs, or simple-sequence repeats.

SSRs are unique, natural duplications in the nucleic acids that comprise the building blocks of genetic material, or DNA. As such, SSRs serve as distinctive fingerprints, suitable for differentiating among individual walnut trees within the same species. Also known as microsatellite markers, the 14 SSRs that the scientists tested "provide a fast, reliable means of positive identification," says Aradhya.

Adapted from a set of microsatellite markers developed by researchers elsewhere for accurately distinguishing one black walnut tree (*J. nigra*) from another, the new assay for *J. regia* offers an excellent way to prevent costly mixups at tree nurseries, growers' orchards, and even at the ARS walnut collection itself. The markers are an example of how ARS investigations help everyone who is involved in growing walnuts and preserving these magnificent trees.—By **Marcia Wood, ARS.**

This research is part of Plant, Microbial, and Insect Genetic Resources, Genomics, and Genetic Improvement, an ARS National Program (#301) described on the World Wide Web at www.nps.ars.usda.gov.

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Protecting the World's Walnuts

About 60 million years ago, walnut trees began to form vast primeval forests on our planet. Today, many of those prehistoric species are extinct. But most that remain are safeguarded at a unique living collection.

Headquartered in Davis, California, about a 90-minute drive north of San Francisco, this genebank serves as America's official collection of walnut species—and their distant, rare, and unusual relatives. Containing specimens from both the Old and New World, it is the largest, most genetically diverse walnut collection anywhere.

Some 80 trees grow in containers, protected inside a screen-enclosed greenhouse. Only 10 minutes away, 1,600 other trees prosper in neat rows at a carefully tended research orchard.

Some *Juglans regia* trees from Armenia are among the collection's most remarkable members. That's because of